WHAT IS CLAIMED IS:

1. An apparatus for positioning of an object in at least one plane comprising:

   a holding member configured to hold the object to be positioned;

   a first axis positioning system, wherein the first positioning system comprises a first set of flexure linkages coupled to the holding member, wherein the first set of flexure linkages is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

   a second axis positioning system, wherein the second positioning system comprises a second set of flexure linkages coupled to the holding member, wherein the second set of flexure linkages is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

2. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members.

3. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members, and wherein two or more elongated members are flexibly coupled to form each linkage.

4. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together.

5. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 20 degree range of motion.

6. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together,

and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

7. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints contain substantially no frictional contact.

8. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints furthers comprises a rolling contact joint.

9. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to constrain the motion of two elongated members of a linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

10. The apparatus of claim 1, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

11. The apparatus of claim 1, further comprising at least one motive device coupled to the holding member.

12. The apparatus of claim 1, further comprising at least one motive device coupled to the holding member, wherein each motive device comprises a magnetic linear servomotor.

13. The apparatus of claim 1, wherein the holding member comprises a wafer chuck.

14. The apparatus of claim 1, wherein the holding member is configured to hold a semiconductor substrate.

15. The apparatus of claim 1, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages.

16. The apparatus of claim 1, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages, and wherein the apparatus is configured to avoid any kinematic singularities resulting from the symmetry.

17. An apparatus for positioning of an object along a first axis comprising
a holding member configured to hold the object to be positioned;
a first set of flexure linkages coupled to the holding member; and
a motive device coupled to the holding member for moving the holding member;
wherein the first set of flexure linkages constrains the motion of the holding member to a substantially linear motion.

18. The apparatus of claim 17, wherein the first set of flexure linkages constrains the motion of the holding member to a single plane.

19. The apparatus of claim 17, wherein the first set of flexure linkages comprises at least two opposed symmetrical linkages.

20. The apparatus of claim 17, wherein the first set of flexure linkages comprises at least two symmetrical flexure linkages, and wherein the apparatus is configured to avoid any kinematic singularities resulting from the symmetry.

21. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together.

22. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 20 degree range of motion.

23. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

24. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints have substantially no frictional contact.

25. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, wherein at least one of the joints further comprises a rolling contact joint.

26. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, wherein at least one of the joints further comprises a rolling contact joint, and wherein each rolling contact joint is configured to constrain the motion of two elongated members of the linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

27. The apparatus of claim 17, wherein each of the flexure linkages comprise elongated members and flexible joints coupling the elongated members together, wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

28. The apparatus of claim 17, wherein the motive device comprises a magnetic linear servomotor.

29. The apparatus of claim 17, wherein the holding member comprises a wafer chuck.

30. The apparatus of claim 17, wherein the holding member is configured to hold a semiconductor wafer.

31. An apparatus for positioning of an object along a first axis and a second axis comprising:
a holding member configured to hold the object to be positioned;
a platform coupled to the holding member;
a first set of flexure linkages coupled to the holding member and the platform;
a second set of flexure linkages coupled to the platform;
a first motive device coupled to the holding member, wherein the first motive device is configured to move the holding member in relation to the platform along a first axis; and
a second motive device coupled to the platform, wherein the second motive device is configured to move the platform along a second axis;
wherein the first set of flexure linkages constrains the motion of the holding member substantially to a single plane along the first axis; and
wherein the second set of flexure linkages constrains the motion of the platform to a single plane along the second axis.

32. The apparatus of claim 31, wherein the first set of flexure linkages comprises at least two opposed symmetrical linkages.

33. The apparatus of claim 31, wherein the second set of flexure linkages comprises at least two opposed symmetrical linkages.

34. The apparatus of claim 31, wherein the first set of flexure linkages comprises at least two opposed symmetrical linkages, and wherein the second set of flexure linkages comprises at least two opposed symmetrical linkages.

35. The apparatus of claim 31, wherein the first set of flexure linkages comprises at least two opposed symmetrical linkages, wherein the second set of flexure linkages comprises at least two opposed symmetrical linkages, and wherein the apparatus is configured to avoid any kinematic singularities resulting from the symmetry.

36. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members.

37. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members, and wherein the elongated members are flexibly coupled to form the linkages.

38. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together.

39. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 20 degree range of motion.

40. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

41. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints contain no frictional contact.

42. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint.

43. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint, and wherein each rolling contact joint is configured to constrain the motion of two elongated members of the linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

44. The apparatus of claim 31, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

45. The apparatus of claim 31, wherein the first motive device comprises a magnetic linear servomotor.

46. The apparatus of claim 31, wherein the second motive device comprises a magnetic linear servomotor.

47. The apparatus of claim 31, wherein the first and second motive devices comprise magnetic linear servomotors.

48. The apparatus of claim 31, wherein the holding member comprises a wafer chuck.

49. The apparatus of claim 31, wherein the holding member is configured to hold a semiconductor substrate.

50. An apparatus for positioning of an object comprising:

a holding member configured to hold the object to be positioned;

a plurality of flexure linkages coupled to the holding member, wherein the flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and

wherein the ratio of the range of motion of the holding member to a characteristic length of the apparatus is greater than 0.05.

51. The apparatus of claim 50, wherein the ratio of the range of motion of the holding member to a characteristic length of the apparatus is greater than 0.2.

52. The apparatus of claim 50, wherein the ratio of the range of motion of the holding member to a characteristic length of the apparatus is greater than 0.3.

53. The apparatus of claim 50, wherein the characteristic length is the square root of the footprint area of the apparatus.

54. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

55. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least 20 degree range of motion.

56. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints contain no frictional contact joints.

57. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the flexible joints further comprises a rolling contact joint.

58. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the flexible joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to constrain the motion of two elongated members of the linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

59. The apparatus of claim 50, wherein the flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the flexible joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

60. The apparatus of claim 50, wherein the holding member comprises a wafer chuck.

61. The apparatus of claim 50, wherein the holding member is configured to hold a semiconductor substrate.

62. A system for forming a pattern on a substrate comprising:

a patterning device; and

a substrate positioning device, the substrate positioning device comprising:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first set of flexure linkages coupled to the holding member, wherein the first set of flexure linkages is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second set of flexure linkages coupled to the holding member, wherein the second set of flexure linkages is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

63. The system of claim 62, wherein the patterning device comprises an imprint lithography device.

64. The system of claim 62, wherein the patterning device comprises a photolithography device.

65. The system of claim 62, wherein the patterning device comprises an electron beam patterning device.

66. The system of claim 62, wherein the patterning device comprises an x-ray patterning device.

67. The system of claim 62, wherein the patterning device comprises an extreme ultraviolet lithography patterning device.

68. The system of claim 62, wherein the patterning device comprises a direct-write laser patterning device.

69. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members.

70. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members, and wherein two or more elongated members are flexibly coupled to form each linkage.

71. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together.

72. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 20 degree range of motion.

73. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

74. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints contain substantially no frictional contact.

75. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints furthers comprises a rolling contact joint.

76. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to constrain the motion of two elongated members of a linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

77. The system of claim 62, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

78. The system of claim 62, further comprising at least one motive device coupled to the holding member.

79. The system of claim 62, further comprising at least one motive device coupled to the holding member, wherein each motive device comprises a magnetic linear servomotor.

80. The system of claim 62, wherein the holding member comprises a wafer chuck.

81. The system of claim 62, wherein the holding member is configured to hold a semiconductor substrate.

82. The system of claim 62, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages.

83. The system of claim 62, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages, and wherein the substrate positioning device is configured to avoid any kinematic singularities resulting from the symmetry.

84. The system of claim 62, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.05.

85. The system of claim 84, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

86. The system of claim 62, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.2.

87. The system of claim 86, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

88. The system of claim 62, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.3.

89. The system of claim 88, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

90. A system for forming a pattern on a substrate comprising:

a patterned template;

a patterned template holder; and

a substrate positioning device, the substrate positioning device comprising:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first flexure linkage coupled to the holding member, wherein the first flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second flexure linkage coupled to the holding member, wherein the second flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

91. The system of claim 90, further comprising a measurement device for determining the alignment between the patterned template and the substrate.

92. The system of claim 90, further comprising a measurement device for determining the alignment between the patterned template and the substrate; wherein the measurement device comprises an optical microscope.

93. The system of claim 90, further comprising a measurement device for determining the alignment between the patterned template and the substrate, wherein the measurement device comprises an optical microscope, and wherein the optical microscope comprises a polarizing light filter.

94. The system of claim 90, further comprising a measurement device for determining the alignment between the patterned template and the substrate, wherein the measurement device comprises an optical microscope, wherein the optical microscope comprises a polarized light source.

95. The system of claim 90, wherein a side edge of the template comprises a reflective coating, and further comprising a laser interferometer optically coupled to the side edge of the template.

96. The system of claim 90, wherein a side edge of the template comprises a mirror coupled to the template, and further comprising a laser interferometer optically coupled to the side edge of the template.

97. The system of claim 90, wherein a side edge of the template comprises a conductive coating, and further comprising a capacitive sensor electrically coupled to the side edge of the template.

98. The system of claim 90, wherein the patterned template comprises an alignment mark, and wherein the alignment mark is complimentary to an alignment mark on a substrate during use.

99. The system of claim 90, further comprising an orientation stage having a first and second orientation axis and configured to orient the template with regard to the substrate.

100. The system of claim 90, further comprising an orientation stage having a first and second orientation axis and configured to orient the template with regard to the substrate wherein the first orientation axis is substantially orthogonal to the second orientation axis.

101. The system of claim 90, further comprising an orientation stage comprising first and second flexure members.

102. The system of claim 90, further comprising an orientation stage comprising a first flexure member; wherein the first flexure member comprises first and second arms, wherein the first arm comprises a first set of flexure joints which are configured to provide pivotal motion of the first flexure member about a first orientation axis, and wherein the second arm comprises a second set of flexure joints which are configured to provide pivotal motion of the first flexure member about the first orientation axis.

103. The system of claim 102, further comprising an orientation stage comprising a second flexure member, wherein the second flexure member comprises third and fourth arms, wherein the third arm comprises a third set of flexure joints which are configured to provide pivotal motion of the second flexure member about a second orientation axis, and wherein the fourth arm comprises a fourth set of flexure joints which are configured to provide pivotal motion of the second flexure member about the second orientation axis.

104. The system of claim 101, further comprising actuators coupled to the first and second flexure members, wherein the actuators are configured to cause pivoting of the first and second flexure members about first and second orientation axes, respectively, during use.

105. The system of claim 101, further comprising actuators coupled to the first and second flexure members, wherein the actuators are configured to cause pivoting of the first and

second flexure members about first and second orientation axes, respectively, during use, wherein the actuators are piezoelectric actuators.

106. The system of claim 101, wherein the first flexure member comprises a first opening, the second flexure member comprises a second opening, and further comprising a template support wherein the support comprises a third opening, wherein each of the first, second and third openings are configured to allow activating light to be directed onto the template during use, wherein the first, second and third openings are substantially aligned when the first flexure member is coupled to the second flexure member.

107. The system of claim 101, further comprising a precalibration stage coupled to the orientation stage, wherein the precalibration stage is configured to move the orientation stage toward and away from the substrate during use.

108. The system of claim 101, further comprising a precalibration stage coupled to the orientation stage, wherein the precalibration stage is configured to move the orientation stage toward and away from the substrate during use, wherein the precalibration comprises at least one actuator coupled to the orientation stage, wherein the actuator is configured to move the orientation stage toward and away from the substrate.

109. The system of claim 101, wherein the orientation stage further comprises:

a first flexure member, wherein the first flexure member is configured to pivot about a first orientation axis during use;

a second flexure member coupled to the first flexure member, wherein the second flexure member is configured to pivot about a second orientation axis during use; and

the template support coupled to the second flexure member, wherein the template support is configured to hold the patterned template during use;

wherein the second flexure member is coupled to the first flexure member such that the patterned template, when disposed in the support, moves about a pivot point intersected by the first and second orientation axis during use.

110. The system of claim 90, wherein the holding member comprises a vacuum chuck, the vacuum chuck comprising a chuck body and a vacuum flow system coupled to the chuck body, wherein the vacuum flow system is configured to apply a suction force at the surface of the chuck body during use.

111. The system of claim 90, wherein the patterned template comprises quartz.

112. The system of claim 90, wherein the patterned template comprises indium tin oxide.

113. The system of claim 90, wherein at least a portion of the patterned template comprises SiOx where x is less than 2.

114. The system of claim 90, wherein at least a portion of the patterned template comprises SiOx where x is about 1.5.

115. The system of claim 90, further comprising a light based measurement device for determining the distance between the patterned template and the substrate.

116. The system of claim 115, wherein the light based measurement device comprises a broad-band spectrometer.

117. The system of claim 115, wherein the measurement device comprises a laser interferometer.

118. The system of claim 115, wherein the light based measurement device comprises at least one optical probe configured to direct light through the template.

119. The system of claim 115, wherein the light based measurement device comprises at least one optical probe configured to direct light through the template, and wherein the optical probe is configured to be movable from a first position, above the template, to a second position, away from the template.

120. The system of claim 115, wherein the measurement device comprises at least one optical probe configured to direct light through the template, and wherein the at least one optical probe is substantially transparent to a selected wavelength of light.

121. The system of claim 115, wherein the measurement device comprises at least one optical probe configured to detect light reflected from the substrate.

122. The system of claim 115, wherein the measurement device comprises at least one optical probe configured to detect light reflected from the substrate, and wherein the optical probe is configured to be movable from a first position, above the template, to a second position away from the template.

123. The system of claim 115, wherein the measurement device comprises at least one optical probe configured to detect light reflected from the substrate, and wherein the at least one optical probe is substantially transparent to a selected wavelength of light.

124. The system of claim 115, further comprising an activating light source, wherein the activating light source is configured to direct activating light toward the substrate during use.

125. The system of claim 90, wherein the substrate comprises at least one layer of a known refractive index on a surface of the substrate.

126. The system of claim 90, wherein the substrate comprises at least one layer of a known refractive index on a surface of the substrate, and wherein the system further comprises a

light based measuring device configured to determine a thickness of the at least one layer on the surface of the substrate.

127. The system of claim 90, further comprising a fluid dispenser.

128. The system of claim 90, further comprising a plurality of fluid dispensers.

129. The system of claim 127, wherein the fluid dispenser is a micro-solenoid fluid dispenser.

130. The system of claim 127, wherein the fluid dispenser is a piezoelectric fluid dispenser.

131. The system of claim 127, wherein the fluid dispenser is positioned at a distance of less than about 500 microns from the substrate during use.

132. A system for inspecting a substrate comprising:

an inspection device; and

a substrate positioning device, the substrate positioning device comprising:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first flexure linkage coupled to the holding member, wherein the first flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second flexure linkage coupled to the holding member, wherein the second flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

133. The system of claim 132, wherein the inspection device comprises a scanning electron microscope.

134. The system of claim 132, wherein the inspection device comprises a scatterometer.

135. The system of claim 132, wherein the inspection device comprises a reflectometer.

136. The system of claim 132, wherein the inspection device comprises a coherence probe microscope.

137. The system of claim 132, wherein the inspection device comprises an interference microscope.

138. The system of claim 132, wherein the inspection device comprises an optical profilometer.

139. The system of claim 132, wherein the inspection device comprises an atomic force microscope.

140. The system of claim 132, wherein the inspection device comprises a scanning tunneling microscope.

141. The system of claim 132, wherein the inspection device comprises a confocal microscope.

142. The system of claim 132, wherein the inspection device comprises a transmission electron microscope.

143. The system of claim 132, wherein the inspection device comprises an electrical fault testing device.

144. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members.

145. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members, and wherein two or more elongated members are flexibly coupled to form each linkage.

146. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together.

147. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 20 degree range of motion.

148. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein each flexible joint is configured to allow rotation of the joint around at least a 40 degree range of motion.

149. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein the flexible joints contain substantially no frictional contact.

150. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints furthers comprises a rolling contact joint.

151. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to constrain the motion of two elongated members of a linkage such that the two elongated members rotate about the joint at substantially the same rate and in opposite directions during use.

152. The system of claim 132, wherein the first and second sets of flexure linkages comprise a plurality of elongated members and flexible joints coupling the elongated members together, and wherein at least one of the joints further comprises a rolling contact joint; and wherein each rolling contact joint is configured to ensure substantially continuous and even contact within the joint over the entire range of motion of the joint.

153. The system of claim 132, further comprising at least one motive device coupled to the holding member.

154. The system of claim 132, further comprising at least one motive device coupled to the holding member, wherein each motive device comprises a magnetic linear servomotor.

155. The system of claim 132, wherein the holding member comprises a wafer chuck.

156. The system of claim 132, wherein the holding member is configured to hold a semiconductor substrate.

157. The system of claim 132, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages.

158. The system of claim 132, wherein the first and second sets of flexure linkages each comprise at least two symmetrical flexure linkages, and wherein the substrate positioning device is configured to avoid any kinematic singularities resulting from the symmetry.

159. The system of claim 132, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.05.

160. The system of claim 159, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

161. The system of claim 132, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.2.

162. The system of claim 161, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

163. The system of claim 132, wherein the first and second sets of flexure linkages are configured to constrain movement of the holding member within a predetermined range of motion; and wherein the ratio of the range of motion of the holding member to a characteristic length of the substrate positioning device is greater than 0.3.

164. The system of claim 163, wherein the characteristic length is the square root of the footprint area of the substrate positioning device.

165. A method of forming a pattern on a substrate comprising:

positioning a substrate on a substrate positioning device, wherein the substrate positioning device is coupled to a patterning device, and wherein the substrate positioning device comprises:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first flexure linkage coupled to the holding member, wherein the first flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second flexure linkage coupled to the holding member, wherein the second flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

forming a pattern on the substrate with the patterning device.

166. A method of inspecting a substrate comprising:

positioning a substrate on a substrate positioning device, wherein the substrate positioning device is coupled to an inspection device, and wherein the substrate positioning device comprises:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first flexure linkage coupled to the holding member, wherein the first flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second flexure linkage coupled to the holding member, wherein the second flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

inspecting the substrate with the inspection device.

167. A method of forming a pattern on a substrate with a patterned template comprising:

positioning a substrate on a substrate positioning device, wherein the substrate positioning device is coupled to an imprint lithography device comprising the patterned template, and wherein the substrate positioning device comprises:

a holding member configured to hold the substrate;

a first axis positioning system, wherein the first axis positioning system comprises a first flexure linkage coupled to the holding member, wherein the first flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a first axis; and

a second axis positioning system, wherein the second axis positioning system comprises a second flexure linkage coupled to the holding member, wherein the second flexure linkage is configured to constrain movement of the holding member to a substantially linear motion along a second axis.

applying an activating light curable liquid to a portion of the substrate;

positioning the patterned template and the substrate in a spaced relation to each other so that a gap is created between the patterned template and the substrate, wherein the applied liquid substantially fills the gap when the patterned template is placed in a spaced relation to the substrate;

applying activating light to the liquid, wherein the application of activating light substantially cures the liquid, and wherein a pattern of the patterned template is formed in the cured liquid; and

separating the patterned template from the cured liquid.

168. The method of claim 167, wherein the patterned template comprises at least one template alignment mark.

169. The method of claim 168, further comprising determining the alignment between the patterned template and the substrate.

170. The method of claim 169, wherein determining the alignment between the patterned template and the substrate comprises:

applying a first wavelength of light through the patterned template, wherein the first wavelength of light causes the substrate alignment mark to be in focus and the template alignment mark to be out of focus with respect to an analysis tool; and

applying a second wavelength of light through the patterned template, wherein the second wavelength of light causes the template alignment mark to be in focus and the substrate alignment mark to be out of focus with respect to an analysis tool.

171. The method of claim 169, wherein determining the alignment comprises using a polarizing light alignment tool, and further comprising placing a polarizing filter system between the polarizing light alignment tool and the patterned template, wherein the polarizing filter system comprises a first polarizing filter substantially oriented over the substrate alignment mark and a second polarizing filter substantially oriented over the template alignment mark, wherein the polarization of light capable of passing through the first polarization filter is substantially different then the polarization of light capable of passing through the second polarization filter.

172. The method of claim 169, wherein determining the alignment comprises using a moiré pattern detector.

173. The method of claim 169, wherein determining the alignment comprises applying an analyzing light to the patterned template, and wherein the patterned template is composed of a first material and wherein the alignment mark is formed by depositing a second material, different from the first material, upon the patterned template, wherein the first and second materials are substantially transparent to the wavelength of activating light used to cure the

liquid, and wherein the second material produces an analyzable mark with substantial contrast when the analyzing light is applied to the patterned template.

174. The method of claim 169, wherein determining the alignment comprises applying an analyzing light to the patterned template, and wherein the template alignment mark comprises a plurality of etched lines that act as a diffraction grating toward the analyzing light, and wherein the template alignment mark is substantially transparent to the activating light.

175. The method of claim 169, wherein the template alignment mark and the substrate alignment comprise symmetric geometric shapes, and wherein determining the alignment of the alignment marks comprises determining the centers of the substrate and template alignment marks, and comparing the location of the center of the template alignment mark to the location of the center of the substrate alignment mark.

176. The method of claim 167, further comprising adjusting the overlay placement of the patterned template and the substrate.

177. The method of claim 167, further comprising adjusting the overlay placement of the patterned template and the substrate; wherein adjusting the overlay placement comprises moving the substrate such that the template alignment mark is substantially aligned with the substrate alignment mark.

178. The method of claim 176, wherein adjusting the overlay placement comprises altering the angle of the patterned template with respect to the substrate.

179. The method of claim 176, wherein adjusting the overlay placement comprises altering the dimensions of the patterned template.

180. The method of claim 176, wherein adjusting the overlay placement comprises altering the dimensions of the patterned template by altering the temperature of the patterned template.

181. The method of claim 176, wherein adjusting the overlay placement comprises altering the dimensions of the patterned template by applying a compressive force to at least a portion of the patterned template.

182. The method of claim 176, wherein adjusting the overlay placement comprises altering the dimensions of the patterned template by applying an elongating force to at least a portion of the patterned template.

183. The method of claim 176, wherein adjusting the overlay placement comprises altering the dimensions of the patterned template, wherein the dimensions of the patterned template are altered by the application of force from at least one piezoelectric actuator coupled to the patterned template.

184. The method of claim 167, wherein applying the activating light curable liquid to a portion of the substrate comprises dispensing the liquid with a fluid dispenser.

185. The method of claim 167, wherein applying the activating light curable liquid to a portion of the substrate comprises dispensing the liquid with a fluid dispenser, and further comprising moving the substrate with respect to the fluid dispenser while the liquid is being dispensed to create a predetermined pattern.

186. The method of claim 167, wherein applying the activating light curable liquid to a portion of the substrate comprises dispensing the liquid with a fluid dispenser, and further comprising moving the substrate with respect to the fluid dispenser while the liquid is being dispensed to create a predetermined pattern, and wherein the predetermined pattern is a pattern that is configured to inhibit the formation of air bubbles in the liquid when the patterned template contacts the liquid as the patterned template and substrate are positioned in a spaced relation.

187. The method of claim 167, wherein applying the activating light curable liquid to a portion of the substrate comprises dispensing the liquid with a fluid dispenser, and further comprising moving the substrate with respect to the fluid dispenser while the liquid is being dispensed to create a predetermined pattern, and wherein the predetermined pattern is selected such that the liquid fills the gap in an area substantially equal to the surface area of the patterned template.

188. The method of claim 167, wherein positioning the patterned template and the substrate in a spaced relationship comprises:

positioning the patterned template over the substrate; and

moving the patterned template toward the substrate until a desired spaced relationship is achieved, wherein the liquid on the substrate substantially fills the gap as the patterned template is moved toward the substrate.

189. The method of claim 167, wherein positioning the patterned template and the substrate in a spaced relationship comprises positioning the patterned template at a distance of less than about 200 nm from the substrate.

190. The method of claim 167, wherein positioning the patterned template and the substrate in a spaced relationship comprises positioning the patterned template in a substantially parallel orientation to the substrate.

191. The method of claim 167, wherein separating the patterned template from the cured liquid comprises:

moving the template to a substantially non-parallel orientation; and

moving the patterned template away from the substrate.

192. The method of claim 167, wherein the patterned template comprises at least some features that are less than 250 nm in size.

193. The method of claim 167, wherein the cured liquid comprises at least some features less than about 250 nm in size after the patterned template is separated from the cured liquid.

194. The method of claim 167, wherein positioning the patterned template and the substrate in a spaced relationship comprises:

positioning the patterned template over the substrate, wherein the patterned template is substantially non-parallel to the substrate;

moving the patterned template toward the substrate, wherein the patterned template remains in a substantially non-parallel orientation with respect to the substrate as the template is moved toward the substrate, and

orienting the patterned template in a substantially parallel orientation to the substrate, wherein the patterned template is in a desired spaced relationship to the substrate.

195. The method of claim 167, further comprising determining the distance between the patterned template and the substrate.

196. The method of claim 167, further comprising determining the distance between the patterned template and the substrate; wherein determining the distance between the patterned template and the substrate using a light based measuring device comprises:

applying light to the template and the substrate, wherein the light comprises a plurality of wavelengths;

monitoring light reflected from a surface of the template and the substrate; and

determining the distance between the template and the substrate based on the monitored light.

197. The method of claim 167, further comprising determining an error signal, wherein the error signal corresponds to the difference between a desired distance between the surface of the patterned template and the substrate and a determined distance between the surface of the patterned template and the substrate; and sending the error signal to at least one actuator, wherein the at least one actuator is configured to position the template and the substrate in a spaced relationship to one another.

198. The method of claim 167, wherein the substrate comprises silicon, gallium, germanium, or indium.

199. The method of claim 167, wherein the substrate comprises a dielectric material.

200. The method of claim 167, wherein the substrate comprises quartz, sapphire, silicon dioxide, or polysilicon.

201. The method of claim 167, wherein the patterned template comprises quartz.

202. The method of claim 167, wherein the patterned template comprises indium tin oxide.

203. The method of claim 167, wherein the activating light curable liquid comprises an ultraviolet light curable composition.

204. The method of claim 167, wherein the activating light curable liquid composition comprises a photoresist material.

205. The method of claim 167, further comprising:

forming a transfer layer on the substrate prior to applying the liquid to the substrate; and

etching the transfer layer after separating the patterned template from the substrate, wherein etching the transfer layer imparts the pattern to the transfer layer.

206. The method of claim 167, wherein the substrate comprises at least one layer on a surface of the substrate.

207. The method of claim 167, wherein the substrate comprises at least one layer on a surface of the substrate; the method further comprising determining a thickness of the at least one layer on the surface of the substrate.

208. The method of claim 167, further comprising determining the distance between the surface of the patterned template and the substrate at 3 or more non-colinear locations and determining whether the surface of the patterned template and substrate are substantially parallel based on the 3 or more distance determinations.

209. The method of claim 167, further comprising determining an error signal, wherein the error signal corresponds to a relative movement between the surface of the patterned template and the substrate required to bring the surface of the patterned template and the substrate into a substantially parallel configuration.

210. The method of claim 167, further comprising determining an error signal, wherein the error signal corresponds to a relative movement between the surface of the patterned template and the substrate required to bring the surface of the patterned template and the substrate into a substantially parallel configuration; and sending the error signal to at least one actuator, wherein the at least one actuator is configured to adjust the relative position of the surface of the patterned template and the substrate to achieve a substantially parallel configuration.

211. A semiconductor device made by the method of claim 167.